

**DISTRIBUTION AND ABUNDANCE
OF THE COASTAL TIGER BEETLE,
CICINDELA DORSALIS MEDIA
(COLEOPTERA: CICINDELIDAE),
IN SOUTH CAROLINA**

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ABSTRACT: We determined the historic distribution of *Cicindela dorsalis media* in South Carolina by examining locality records of university, museum and private collections. Present distribution and abundance were determined by surveys of these and other coastal beach sites. We found *C. d. media* at nine of 14 historic sites and at five of 15 new sites. The greatest numbers, >5000 individuals, occurred on Capers, Dewees, and Bull Islands. Pawleys Island and Litchfield had 300-500 individuals; smaller numbers occurred at nine sites. Large numbers of beetles at a site could be explained by high densities rather than a larger habitat size. We conclude that *Cicindela d. media* is common and widespread along much of the South Carolina shoreline, except for the beaches north of Huntington Beach from which it has apparently been extirpated by high levels of recreational use. Populations at several other sites may have declined, but the lack of any published information on earlier abundance makes this impossible to accurately determine.

Cicindela dorsalis Say is widely distributed in sandy beach habitats of the Atlantic and Gulf coasts of the United States. Four subspecies are recognized, with ranges as follows: *C. dorsalis dorsalis* Say from Cape Cod south to central New Jersey and within the Chesapeake Bay of Maryland and Virginia; *C. d. media* LeConte from southern New Jersey to near Miami; *C. d. sauleyi* Guerin from the southern Gulf coast of Florida through Alabama and Mississippi; and *C. d. venusta* LaFerte from Louisiana to south Texas (Boyd and Rust 1982). One of these subspecies, *C. d. dorsalis*, has recently been listed as threatened by the U. S. Fish and Wildlife Service (USFWS 1990). It was extirpated from all but one of the known sites along the northeast Atlantic coast because of destruction and disturbance of natural beach habitats by heavy recreational use and coastal development activities (Knisley *et al.* 1987). It now occurs at only one northeastern site, a Martha's Vineyard beach, and at numerous Chesapeake Bay beaches in Maryland and Virginia. The other subspecies have apparently not yet experienced such rangewide decline, although populations of *C. d. media* at some sites in Florida have been extirpated (P. M. Choate, pers. comm.). On Assateague Island, MD, *C. d. media* is now restricted to only the northern 5 km of the island's shoreline where vehicle and pedestrian use is restricted (Knisley and Hill 1992). It has been extirpated from the other 30 km of the island's Maryland shoreline because of heavy vehicle and pedestrian use (Glaser 1977, Knisley and Hill 1992).

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Cicindela d. media has been reported from 12 South Carolina sites (Cartwright 1935, Freitag and Tropea 1969, Choate 1975). Similar to many other Atlantic coastal states, South Carolina's beaches have experienced severe impact from human activities and natural factors (Neal *et al.* 1984), which may have caused the decline or extirpation of some *C. d. media* populations. The objectives of this study are to compare the historic and current distribution and abundance of *C. d. media* in South Carolina and to identify factors which might threaten it.

MATERIALS AND METHODS

The historic distribution of *C. d. media* in South Carolina was determined from locality records of specimens in 13 university and museum collections (AMNH, CAS, Clemson Univ., Cornell Univ., Fla. Div. Plant Indus., LA State Univ., Mich. State Univ., MCZ [Harvard], Texas A & M Univ., Rutgers Univ., USNM, Univ. Mich. Museum Zool., Peabody Mus. [Yale]), nine private collections (David Brzoska, Gary Dunn, John Glaser, Barry Knisley, Norman Rump, Tom Schultz, Jay Shetterley, John Stamatov, Ron Turnbow) and from the published literature. The present distribution and abundance were determined from visits to 29 coastal beach sites, including the 14 historic sites and 15 other sites. Surveys were conducted on warm sunny days at 1000-1800 hr from mid-June through July when populations were at or near peak abundance. We used a census method which involved walking along the upper intertidal zone and counting the adult beetles which are concentrated in the wet tidal zone during the day. Spot checks of the middle and back beaches were also made at each site and any beetles there counted. At most sites we surveyed a 1500-2000 m length of beach, but at larger sites (with > 5000 m of shoreline), we surveyed three separate 1600 m sections (north end, middle, south end). We determined maximum densities by counting beetles in 5-10 10-meter long sections of beach where beetles were the most abundant. Standard U. S. G. S. topographic maps were used to determine the exact locations of sites surveyed. For each site we determined ownership and obtained information on pedestrian and vehicle use from park officials or local residents, or from our own counts during the surveys. Additional information, including erosion rates, shoreline structures, and storm damage, was obtained from the South Carolina Coastal Council and from Neal *et al.* (1984).

RESULTS

Our compilation of collection records indicates that *C. d. media* occurred at 14 sites in South Carolina. We found no information about population size at any sites. Our surveys found *C. d. media* at 9 of these 14 historic sites and at 5 of 15 new sites (Table 1). No beetles were found at any of the nine north-

ernmost sites, from Garden City north through Myrtle and North Myrtle Beaches (Fig. 1). The census results from our studies should be considered as minimum population sizes because other studies with *C. d. dorsalis* indicate a census gives a two to three fold underestimate of the numbers actually present (Knisley, unpublished). The largest observed numbers, over 5000 individuals, were at Capers, Dewees, and Bull Islands (Table 1). Pawleys Island and Litchfield Beach had 300-500 individuals and six other sites had 100-300 individuals. Small numbers, of 100 or fewer observed individuals occurred at three sites. The differences in abundance were the result of differences in densities, and not the length of beach at the site because the length of beach surveyed was similar at all sites (Table 1). For example, densities at sites with the greatest beetle abundance were as high as 100 to 200 individuals per 10 m of beach and 10-40 or less at sites with smaller populations. At most sites the beetles tended to be localized within small patches (50-200 m long) of beach habitat, usually at the north or south ends of the island sites and were rare or absent in the middle sections.

Most of the surveyed sites were public beaches, state or county parks, private resorts, or preserves (Table 1). The public beaches and parks generally had the highest use and the lowest beetle populations. Most sites received at least a moderate amount of pedestrian recreational use. Vehicles are now prohibited on most South Carolina beaches. However, numbers at some sites may be low due to impacts of past vehicular use. The northern beaches and Folly Beach and Isle of Palms (northern section) were among the most heavily used beaches. Capers, Dewees, and Bull Islands have the lowest use. Most sites had evidence of recent or active erosion and received beach nourishment in recent years or have shoreline stabilization structures (Table 1).

DISCUSSION

The results of this survey indicate that *C. d. media* continues to occur over much of coastal South Carolina, except for the northern shoreline (beaches north of Huntington Beach). Because there were no previous systematic surveys of the South Carolina beaches and no published information on population sizes, we cannot fully determine changes in distribution and abundance of *C. d. media* in South Carolina. However, its absence and apparent extirpation from all of the northern South Carolina beaches is probably the result of the intense recreational use at and near Myrtle Beach. The primary impact here is the high density of pedestrian foot traffic on the beaches. Vehicle activity probably has little impact in most South Carolina beaches because it is limited to service or patrol activities. *Cicindela d. media* may also have disappeared from Edisto Island State Park because "large numbers" were found there in 1988 (Tom Schultz, pers. comm.). Human impact is also suggested by

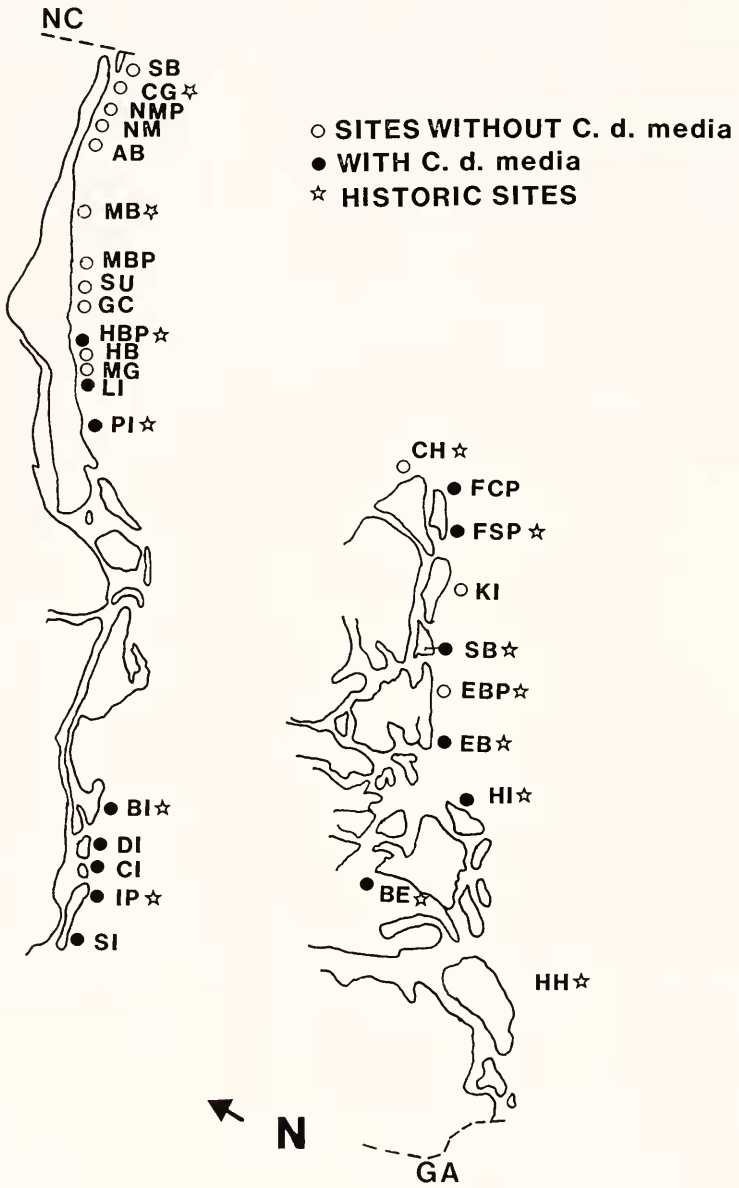


Figure 1. Map of the South Carolina shoreline showing sites surveyed. Site abbreviations are as in Table 1.

Table 1. South Carolina survey sites, beetle densities and total numbers, and relevant site characteristics (* = historic sites). Densities are the highest of 5-10 10 meter lengths of beach per site or section. Abbreviations for shoreline modifications are I = inlet stabilization, N = nourishment, G = groins, S = seawall or revetment.

Site Abbrev.	Site Name	Shorel. Modific.	Owner-ship	Beetle No. Obser.	Census Estimate	
SB	Sandy Beach	-	Public	0	0	
*CG	Cherry Grove	S	Public	0	0	
NMP	N. Myrtle Beach Pk.	-	Public	0	0	
NM	N. Myrtle Beach	S	Public	0	0	
AB	Atlantic Beach	G	Public	0	0	
*MB	Myrtle Beach	S,G	Public	0	0	
MBP	Myrtle B. S. Pk.	-	State Park	0	0	
SU	Surfside	-	Public	0	0	
GC	Garden City	S	Public	0	0	
*HBP	Huntington B. S.. Pk.	I	State	20	150-200	
HB	Huntington Beach	-	Public	0	0	
MG	Magnolia Beach	-	Public	0	0	
LI	Litchfield	North	N	Public	20	150-200
		Middle	N	Public	0	0
		South	N	Private	10-20	150-200
*PI	Pawleys Is.	North	N,G	Public	25	200-300
		Middle	N,G	Public	0	0
		South	N,G	Public	15-20	100-200
*BI	Cape Romain (Bull Is)	-	U.S Govt.	100-200	>5000	
DI	Deweese Island	-	Private	100-200	>5000	
CI	Capers Island	-	State	100-200	>5000	
*IP	Isle of Palms	North	N,S	Private	30-40	100-200
		Middle	N,S	Public	0	0
		South	-	Public	0	0
SI	Sullivans Is.	North	G	Public	0	0
		Middle	G	Public	0	0
		South	-	Public	10-20	50
*CH	Charleston	-				
FCP	Folly Beach County Pk.	North	N,G,S	County	0	0
		Middle	N,G,S	County	0	0
		South	N,G,S	County	15-20	50-100
*FSP	Folly B. S. P.	North	N,G	State	0	0
		Middle	N,G	State	0	0
		South	N	State	25	100-200
KI	Kiawah	-	Private	0	0	
*SB	Seabrook	N,S	Private	25	200	
*EBP	Edisto Bch. S.P	North	N	State Park	0	0
		Middle	N	State Park	0	0
		South	N	State Park	0	0
*EB	Edisto Beach	North	N,G	Public	0	0
		Middle	N,G	Public	0	0
		South	N	Public	25	100
*HI	Hunting Island S. P.	N	State	25	100-200	
*BE	Beaufort	-				
*HH	Hilton Head Island					
	Sea Pines Tower Beach	N,G	Private	25-35	50-100	

the absence or small numbers at sites with highest amounts of human activity or with beach stabilization structures (seawalls, groins, revetments). Populations of *C. d. dorsalis* on Chesapeake Bay beaches and *C. d. media* on Virginia's isolated barrier islands typically have 2000 or more individuals at sites with little or no human activity or shoreline modifications.

Bull, Dewees and Capers Islands were sites not previously surveyed and had the largest populations of *C. d. media*. These sites have very little pedestrian use, but were all totally submerged by the storm surge from Hurricane Hugo in 1989. Such natural events may actually benefit *C. d. media* by creating new beach habitat as a result of the overwash and sand deposition. Several sites with active accretion of sand (Edisto, Hilton Head, Seabrook, and Sullivans Islands) also supported populations. Many of the sites which had beach nourishment had *C. d. media*, indicating that this may not have a negative impact on the species.

Other barrier islands in South Carolina not surveyed in this study may also support populations. These include Waites, North, South, Cedar, Murphy, Morris, Botany Bay, Pine, Pritchards, Bay Point, and Daufauski Islands.

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